CLAIMS

1. A microphone assembly comprising

- a microphone assembly casing having a sound inlet port,

- a transducer for receiving acoustic waves through the sound inlet port, and for converting received acoustic waves to analog audio signals, said transducer being positioned within the microphone assembly casing,

- an electronic circuit positioned within the microphone assembly casing, said electronic circuit comprising

  - a pre-amplifier having an input and an output terminal, the input terminal being connected to the transducer so as to receive analog audio signals from the transducer, and

  - an analog-to-digital converter having an input and an output terminal, the input terminal being connected to the output terminal of the pre-amplifier so as to receive amplified analog audio signals from the pre-amplifier and to convert said amplified analog audio signals to digital audio signals.

2. A microphone assembly according to claim 1, wherein the analog-to-digital converter comprises a sigma-delta modulator.

3. A microphone assembly according to claim 2, further comprising filter means between the transducer and the sigma-delta modulator.

4. A microphone assembly according to claim 3, wherein the filter means is connected between the pre-amplifier and the sigma-delta modulator so as to filter amplified analog audio signals.

5. A microphone assembly according to claim 4, wherein the filter means comprises a high-pass filter.

6. A microphone assembly according to claim 2, wherein the pre-amplifier and the sigma-delta modulator are integrated on a chip so as to form a monolithic integrated circuit.

7. A microphone assembly according to claim 5, wherein the pre-amplifier, the sigma-delta modulator, and at least part of the high-pass filter are integrated on a chip so as to form a monolithic integrated circuit.

8. A microphone assembly according to claim 5, wherein the pre-amplifier, the sigma-delta modulator, and at least part of the high-pass filter are implemented on separate chips so as to form separate electronic circuits.

9. A microphone assembly according to claim 1, wherein the transducer comprises a flexible diaphragm having a pressure equalizing opening penetrating the diaphragm.

10. A microphone assembly according to claim 9, wherein the pressure equalizing opening has dimensions so that frequencies in the analog audio signals below a predetermined frequency value are suppressed.

11. A microphone assembly according to claim 6, further comprising a digital filter connected to the output terminal of the sigma-delta modulator, said digital filter forming part of the monolithic integrated circuit.

12. A microphone assembly according to claim 11, wherein the digital filter is a digital decimation low-pass filter.

13. A microphone assembly according to claim 1, further comprising a low-pass filter between the pre-amplifier and the analog-to-digital converter so as to low-pass filter amplified analog audio signals.

14. A microphone assembly according to claim 1, further comprising a band-pass filter between the pre-amplifier and the analog-to-digital converter so as to band-pass filter amplified analog audio signals.

15. A microphone assembly according to claim 4, further comprising an amplifier between the filter means and the sigma-delta modulator so as to amplify the filtered analog audio signals.

16. A microphone assembly according to claim 15, wherein the amplifier forms part of a monolithic integrated circuit further comprising the pre-amplifier, the filter means and the sigma-delta modulator.

17. A portable unit comprising

- a microphone assembly according to claim 1, said microphone assembly being connected to a pure digital signal processor for further signal processing.

18. A portable unit according to claim 17, wherein the portable unit is selected from the group consisting of hearing aids, assistive listening devices, mobile recording units, such as MP3 players; and mobile communication units, such as mobile or cellular phones.

19. A method of processing received acoustical signals, said method comprising the steps of

- receiving acoustical signals within a microphone casing,

- converting the received acoustical signals to analog audio signals within the microphone casing,

- amplifying the converted analog audio signals within the microphone casing, and

- converting the amplified analog audio signals to digital audio signals within the microphone casing.

20. A method according to claim 19, further comprising a step of filtering the amplified analog audio signals prior to converting the converted analog audio signals to digital audio signals.

21. A method according to claim 20, wherein the filtering step comprises high-pass filtering of the amplified analog audio signals.

22. A method according to claim 19, further comprising a step of digitally processing the digital audio signals.

23. A method according to claim 22, wherein the step of digitally processing the digital audio signals comprises filtering of the digital audio signals.

24. A method according to claim 19, further comprising a step of transmitting the digital audio signals to a pure digital signal processor for further processing.

25. A method according to claim 23, further comprising a step of transmitting digitally filtered digital audio signals to a pure digital signal processor for further processing.

26. A microphone assembly comprising

- a microphone assembly casing having a first and a second sound inlet port,

- a first transducer for receiving acoustic waves through the first sound inlet port, and for converting received acoustic waves to analog audio signals, said first transducer being positioned within the microphone assembly casing,

- a second transducer for receiving acoustic waves through the second sound inlet port, and for converting received acoustic waves to analog audio signals, said second transducer being positioned within the microphone assembly casing,

- an electronic circuit positioned within the microphone assembly casing, said electronic circuit comprising

  - a pre-amplifier module having input and output terminals, a first input terminal being connected to the first transducer, a second input terminal being connected to the second transducer and

- an analog-to-digital converter module having input and output terminals, a first input terminal being connected to a first output terminal of the pre-amplifier, a second input terminal being connected to a second output terminal of the pre-amplifier.

27. A microphone assembly according to claim 26, wherein the pre-amplifier module comprises a first and a second pre-amplifier.

28. A microphone assembly according to claim 27, wherein the analog-to-digital converter module comprises a first and a second sigma-delta modulator, the first sigma-delta modulator being connected to the first pre-amplifier, the second sigma-delta modulator being connected to the second pre-amplifier.

29. A microphone assembly according to claim 28, further comprising a first high-pass filter between the first transducer and the first sigma-delta modulator, and a second high-pass filter between the second transducer and the second sigma-delta modulator.

30. A microphone assembly according to claim 29, wherein at least part of the high-pass filters, the pre-amplifiers, and the sigma-delta modulators are integrated so as to form an integrated circuit.

31. A microphone assembly according to claim 26, further comprising an analog beam forming circuitry positioned between the pre-amplifier module and the analog-to-digital converter module.

32. A microphone assembly according to claim 26, further comprising a digital beam forming circuitry adapted to receive digital signals from the analog-to-digital converter module.

33. A microphone assembly according to claim 31, wherein the pre-amplifier module, the analog-to-digital converter module, and the analog beam forming circuitry are integrated so as to form an integrated circuit.

34. A microphone assembly according to claim 32, wherein the pre-amplifier module, the analog-to-digital converter module, and the digital beam forming circuitry are integrated so as to form an integrated circuit.